ASOS MODIFICATION NOTE 54 (for Electronics Technicians)
Engineering Division
W/OSO321:WW/WDW

SUBJECT	:	Installation of the Solid-State Time-Delay Relay (SSTDR), Digitial Output Module (DOM), and Uninterruptible Power Supply (UPS) Bypass Circuit (UPSBC) into the Automated Surface Observing System (ASOS) Acquisition Control Unit (ACU)
PURPOSE	:	In the event of a UPS failure, the addition of a SSTDR, DOM, and UPSBC will ensure a proper reset of the ACU while bypassing the UPS.
EQUIPMENT AFFECTED	:	All Class II ASOS ACUs and all Class I ASOS ACUs with an installed UPS
PARTS REQUIRED	:	Modification kit S100-FMK95ACU (Class II ACU) 36" - 14-gauge hook-up wire (not supplied in Field Modification Kit (FMK))
MOD PROCUREMENT:		This FMK will be initial issue by Washington Central Support and is required for all Class II ACUs or ACUs with a UPS.
EFFECTIVITY	:	All ACUs with UPS installed
SPECIAL TOOLS REQUIRED	:	Wire stripper Crimping tool Small slotted screwdriver Medium phillips screwdriver 36 inches of 14-gauge hook-up wire Voltmeter
TIME REQUIRED	:	3 hours per ACU
EFFECT ON OTHER INSTRUCTIONS	:	Modification Notes 47 and 50 must be installed prior to or in conjunction with this modification.
AUTHORIZATION	:	This modification is authorized by ECP **E99SM05F093D**.
VERIFICATION STATEMENT	:	This modification was tested for operational integrity at the operational test and evaluation (OT&E) sites listed in appendix A.

GENERAL

This modification note provides procedures for installing the SSTDR, DOM, and UPSBC into all ASOS ACUs with an installed UPS. When the UPS fails, the UPSBC bypasses the UPS allowing facility power to be directly applied to the ACU. The SSTDR will delay the activation of the ACU for 3 seconds. The delay ensures a proper reset of the ASOS's radio frequency modem(s), pressure sensors, and power supplies.

PROCEDURE

The following instructions are for the installation of the SSTDR, DOM, and UPSBC into all ASOS ACUs with an installed UPS. If installing modification 47, 49, and 50 at the same time, complete steps 3 through 14 of the installation procedure.

BEFORE INSTALLATION OF THE SSTDR, DOM, AND UPSBC

1. Ensure the FMK has all the parts listed in appendix C.

2. Contact the ASOS Operations Monitoring Center (AOMC) at 1-800-242-8194 and provide notification on which ASOS will have the SSTDR/UPSBC installed.

3. Get approval of the responsible MIC/OIC/Observer before starting installation. This modification may be installed on any day of the month if restrictions in steps 3 and 4 are satisfied.

4. Commissioned sites only: Do not start installation during inclement weather, precipitation, instrument flight rule conditions, or if any of those conditions are expected within 3 hours. The responsible MIC/OIC/Observer will define those meteorological conditions.

5. Do not start the SSTDR installation at a time that will conflict with scheduled synoptic observations at 00, 03, 06, 09, 12, 15, 18, and 21Z. Although 2 hours *per* SSTDR, DOM, and UPSBC should be sufficient, allow 3 hours *per* ACU to complete installation and restart the ASOS.

6. Immediately before beginning work at National Weather Service (NWS)-staffed sites, the MIC/OIC/Observer will inform the air traffic control tower (ATCT) and any other critical users the ASOS will be shut off for the SSTDR, DOM, and UPSBC installation (for unstaffed sites, the electronics technician will inform the ATCT).

7. Do not begin the installation process until immediately after an hourly observation has been transmitted. At NWS-staffed sites, normal back-up observing procedures will be implemented.

8. Make the appropriate SYSLOG entries, (MAINT-ACT-FMK) Mod 54.
    a. Log on as **TECH**.
    b. Key the **MAINT** screen.
    c. Key the **ACT** page.
    d. Key **START** - stop here and perform "INSTALLATION OF THE SSTDR/UPSBC."

INSTALLATION OF THE SSTDR, DOM, AND UPSBC

A. Class II ACU SSTDR (K1), DOM (K2), and UPSBC (XK3):

WARNING
Ensure the air-condition (AC) power is completely removed from the ACU. Death or severe injury may result if power is not completely removed from the ACU prior to installing the SSTDR/UPSBC.

1. Remove AC power to the UPS.

Note:
    To allow more working room for this modification, the power supply assembly rack (1A4) can be slid out at the technician's discretion.

2. Remove the AC facility power from the ACU by disconnecting the power plug from J41 on the input output (I/O) panel at the rear of the ACU cabinet.

3. Open the rear door to the ACU.

4. Locate the din rail that supports the power distribution block (PDB), 1A7. Move any wires out of the way that might be blocking access to the right side of this din rail.

5. On the din rail, loosen the left hand screw and remove the right hand screw. Swing the din rail out of the back of the ACU. (This will allow the SSTDR, DOM, and UPSBC components to be slid on).

6. Install the SSTDR bracket on the din rail to the right of the PDB. Refer to figure 1.

7. Install the SSTDR (K1) on the bracket using the machine screw .

8. Slide the digital output module (K2) onto the din rail, with connectors 1 and 2, positioned facing out of the back of the ACU. Refer to figure 1.

Note:
    The yellow rectangular 5-amp fuse on the DOM K2 module is loose fitting. Be sure to check its seating in the K2 module.

9. Locate the relay socket (XK3).

10.   Into each side of the XK3 socket, push in the relay hold-down clips. Refer to figure 2.
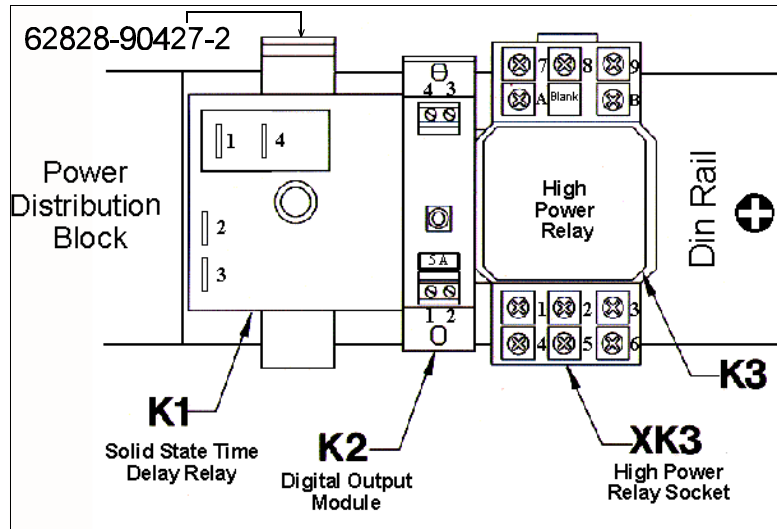
EHB-11
Issuance 99-

Figure 1   SSTDR, DOM, and UPSBC Assembly

11.   Now install the high-powered relay K3 into the relay socket XK3.

12.   Refer to figure 2 and install the wire retainer, over the K3 relay, by attaching it to the relay hold-down clips. This wire will secure the K3 relay to the XK3 socket.

13.   Slide the XK3 module onto the din rail, with connectors 1-6, pointing out of the back of the ACU cabinet. Refer to figure 1.
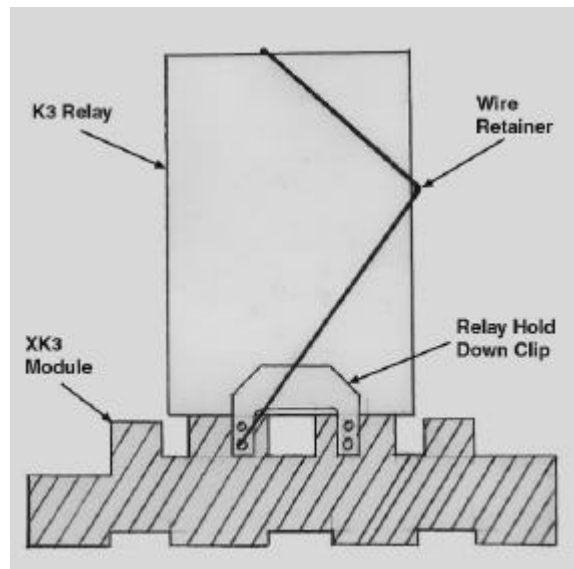

**Figure 2   High Power Relay
               Side View**

14. Attach the plastic gray end clamp, included in the mod kit, to the din rail beside the SSTDR, DOM, and UPSBC assembly. This clamp will secure the K1, K2, and XK3 modules to the din rail.

15. The following steps are recommended to be performed in the order prescribed. *(This will eliminate any back tracking)*.

   a. Open the wiring harness supplied in the mod kit and tie the four long, thin wires to an area near the VME rack and lay the remainder of the harness near the SSTDR, DOM, and UPSBC assembly.

Note:
Appendix B contains a complete wiring diagram of this modification note.

Note:
When making connections to the PDB, ensure the wires are not inserted too far into their terminals. If this occurs and the terminal screw is tightened down, the wire insulation may prevent proper contact from taking place. Likewise, check each connection made to the PDB by giving a slight tug on each wire.

   b. Disconnect wire 1A7-18C/A4CB-1 from A7-18C. Cap for later use.

   c. Connect wire labeled A7-18B/A7K1-1 to A7-18B (wire located in bundle W138).

   d. Connect wire labeled A7-18C/A7K1-2 to A7-18C (wire located in bundle W138).

   e. Connect wire labeled A7XK3-5/A7K2-1 to XK3-5 (wire located in bundle W137).

   f. Disconnect wire (P13-1/1A7-23A) from A7-23A. Cap for later use.

   g. Connect wire labeled A7-23A/A7XK3-8 to A7-23A.

   h. Disconnect wire (P13-2/1A7-22A) from A7-22A. Cap for later use.

   i. Connect wire labeled A7-22A/A7XK3-9 to A7-22A.

   j. The XK3 relay ends of the four wires tied up near the VMEbus will be connected at this time. The VMEbus connectors will be connected in step dd.

      i. Connect wire labeled A7XK3-7/A2XA15P2-A7 to XK3-7.

      ii. Connect wire labeled A7XK3-1/A2XA15P2-B2 to XK3-1.

      iii. Connect wire labeled A7K2-4/A2A15P2-A13 to K2-4.

      iv. Connect wire labeled A7K2-3/A2XA15P2-B1 to K2-3.

   k. Connect wire labeled A7XK3-A/A7K2-2 to XK3-A.

l. Connect wire labeled A7XK3-6/A7XK3-B to XK3-6.

m. Connect wire labeled A7-19B/A7XK3-3 to A7-19B.

n. Take the disconnected wire in step f (P13-1/1A7-23A) and add at least a 6-inch extension of 14-gauge wire using a butt splice. Attach a spade lug to the end and apply label A7XK3-5. Connect wire to XK3-5.

Note:
There will now be two wires connected to XK3-5.

o. Take the wire disconnected in step b (1A7-18C/A4CB-1) and add at least a 6-inch extension of 14 gauge wire using a butt splice. Attach a spade lug to the end and apply label A7XK3-2. Connect the wire to XK3-2.

p. In wire bundle W138, locate wire labeled A7-23A/A7K1-4 and remove it from the bundle. Remove this label and relabel it A7XK3-2/A7K1-4. This wire will make the connection between K1-4 and XK3-2 and therefore can be shortened to a more suitable length, at this time, if desired. Crimp on a spade connector and connect the wire to XK3-2.

Note:
There will now be two wires connected on XK3-2.

q. Connect wire A7-19B/A7K1-3 to A7-19B.

Note:
There will now be two wires connected on A7-19B.

r. Connect wire A7K2-1/A7XK3-5 to K2-1.

s. Connect wire A7K2-2/A7XK3-A to K2-2.

t. Connect wire A7XK3-3/A7-19B to XK3-3.

u. Connect wire A7XK3-9/A7-22A to XK3-9.

v. Connect wire A7XK3-8/A7-23A to XK3-8.

w. Connect wire A7XK3-B/A7XK3-6 to XK3-B.

x. Take the wire disconnected in step h (P13-2/1A7-22A) and add at least a 6-inch extension of a 14-gauge wire using a butt splice. Attach a spade lug to the end and apply label A7XK3-B. Connect this wire to XK3-B.

Note:
There will now be two wires connected to XK3-B.

y. Connect wire A7K1-1/A7-18B to K1-1.

z. Locate the wire labeled A7K1-4/A7-23A, relabel it A7K1-4/A7XK3-2, and connect it to K1-4.

aa.   Connect wire A7K1-3/A7-19B to K1-3.

bb.   Connect wire A7K1-2/A7-18C to K1-2.

cc.   Reinstall the din rail.

dd.   The following should be performed at the VMEbus chassis (1A2XA15-**P2**):

Note:
When inserting the wires into the digital I/O (1A2XA15) connector terminal (P2), be sure to listen for a "click" sound. This will indicate the pin is seated properly inside the connector terminal.

i. Remove the digital I/O board (1A2XA15) from the VMEbus. (This will reduce the likelihood of any damage to the pins as they are pushed in from the back side of the digital I/O board).

ii. At the rear of the ACU cabinet, locate the lower portion (P2) of the digital I/O board (1A2XA15**P2**).

iii. Unsecure the four thin wires, as mentioned in step k, from the ACU cabinet.

iv. Insert the wires' pins into their respective slots in the P2 connector terminal. *Insert the pin with a retaining clip in a down position.* **Inserting these pins in sideways will result in damage to the clips.** (Refer to figure 3).

Note:
Take extra care and properly locate the correct columns on the back of the connector terminal.
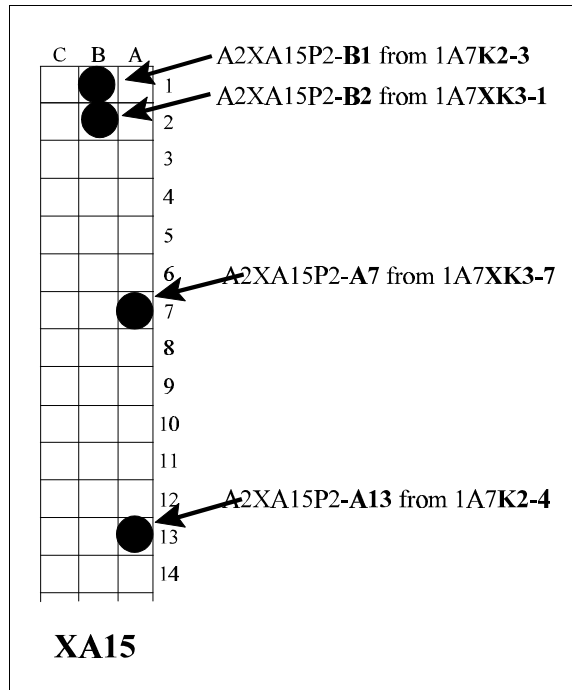
**Figure 3   Digital I/O (XA15)
                    Connector Terminal (P2)**

    ee.   Reinstall the digital I/O board.

    ff. Spot tie any loose wire using the 3-1/2"-long wire tie wraps, and apply the large label included in the FMK to the inside of the rear ACU door.

16.   Reinstall the din rail using hardware removed in step 5, page 3.

17.   Slide the power supply assembly rack (1A4) back into the ACU and reattach the mounting hardware, if this rack was pulled out earlier.

18.   Reapply the AC facility power to the ACU.

19.   Reapply the AC power to the UPS. If the UPS power light is blinking, press the UPS alarm/reset button on the front panel of UPS.

Note:
    When the facility power is reapplied to the ACU, there will be approximately a 3-second delay until the ACU begins to run.

20.   If doing in conjunction with Modification Note 47, proceed to Modification Note 47, page 7, step 19. Proceed with the "VERIFICATION PROCEDURE FOR THE CLASS II ACU SSTDR, DOM, AND UPSBC."

VERIFICATION PROCEDURE FOR THE CLASS II ACU SSTDR, DOM, AND UPSBC

1. Return to the OID and log on as a technician.

2. From the 1-minute screen, press:
   MAINT
   SEL
   NEXT or **PREV** until "ACU UPS" is highlighted.
   SEL

3. Verify the UPS-bypass switch CMDUPS INLINE is ON and the UPS INLINE is "P."

4. Set the CMDUPS INLINE to "OFF" by pressing the **BYPAS** key.

5. Wait approximately 2 minutes, and the UPS INLINE should indicate a failure, "F." (In the SYSLOG, an error message will appear: ACU UPS BYPASSED).

6. On the XK3, verify there are <10 VAC present across pins A and B.

7. Set the CMDUPS INLINE to "ON" by pressing the **BYPAS** key.

8. Wait approximately 2 minutes, and the UPS INLINE should indicate a pass, "P."

9. Completely remove facility power to the ACU cabinet by removing the ACU input plug, J41, on the back of the ACU cabinet. (The ACU should go to battery mode, and the system clock should continue to update without a glitch).

10. Wait approximately 2 minutes, and the ON AC LINE should both indicate a failure, "F." (In the SYSLOG, an error message will appear: "ACU UPS IS ON BATTERY POWER.")

11. Plug the AC input power back into the ACU cabinet at J41. Wait approximately 2 minutes, and the ON AC LINE should indicate a pass, "P" (In the SYSLOG, an error message will appear: "ACU UPS POWER RESTORED.")

12. Check the 12 HR pages to ensure all data are being collected from the sensors. Clear all failures on the MAINT pages for the ACU and DCP caused by powering down the system.

13. When complete, key **EXIT**.

14. Proceed with the "AFTER INSTALLATION OF THE CLASS II ACU SSTDR, DOM, and UPSBC."

AFTER INSTALLATION OF THE CLASS II ACU SSTDR, DOM, AND PSBC

1. Call the AOMC at 1-800-242-8194 and inform the operator of:
   a. Your location.
   b. The installation of the SSTDR, DOM, and UPSBC has been completed.

2. Enter in the SYSLOG that maintenance has been completed.
   a. Key the **MAINT** screen.
   b. Key the **ACT** page.
   c. Key **FMK** - enter the FMK number as follows: **Mod 54**. On the second line of the screen, verify that only Mod 54 is displayed. Complete by entering **Y** in the [Y/N] area, if only Mod 54 is displayed. If other modifications are completed, make the appropriate log entry.
   d. Check the SYSLOG and verify the FMK message. Enter a comment in the SYSLOG stating the SSTDR has been installed.

REPORTING MODIFICATION

Target date for completion of this modification is 30 days for commissioned sites and 45 days for non-commissioned sites, after the receipt of parts. Report completed modification on a WS Form A-26, Maintenance Record, appendix B, using the instructions in Engineering Handbook No. 4 (EHB-4), Engineering Management Reporting System (EMRS), part 2, appendix F. Report the modification to the ACU using the equipment code **AACU** in block 7. Record a modification number of **54** in block_17a of the A-26. See appendix B for a completed sample of WS Form A-26, Maintenance Record.

Original Signed

John McNulty
Chief, Engineering Division

Appendix A - Test Sites
Appendix B - SSTDR, DOM, and UPSBC Wiring Diagram
Appendix C - Parts List
Appendix D - A-26

10/5/99:A.Wissman:713-1833x147
File:K:\oso32\oso321\Asos Temps\Mod54.wpd
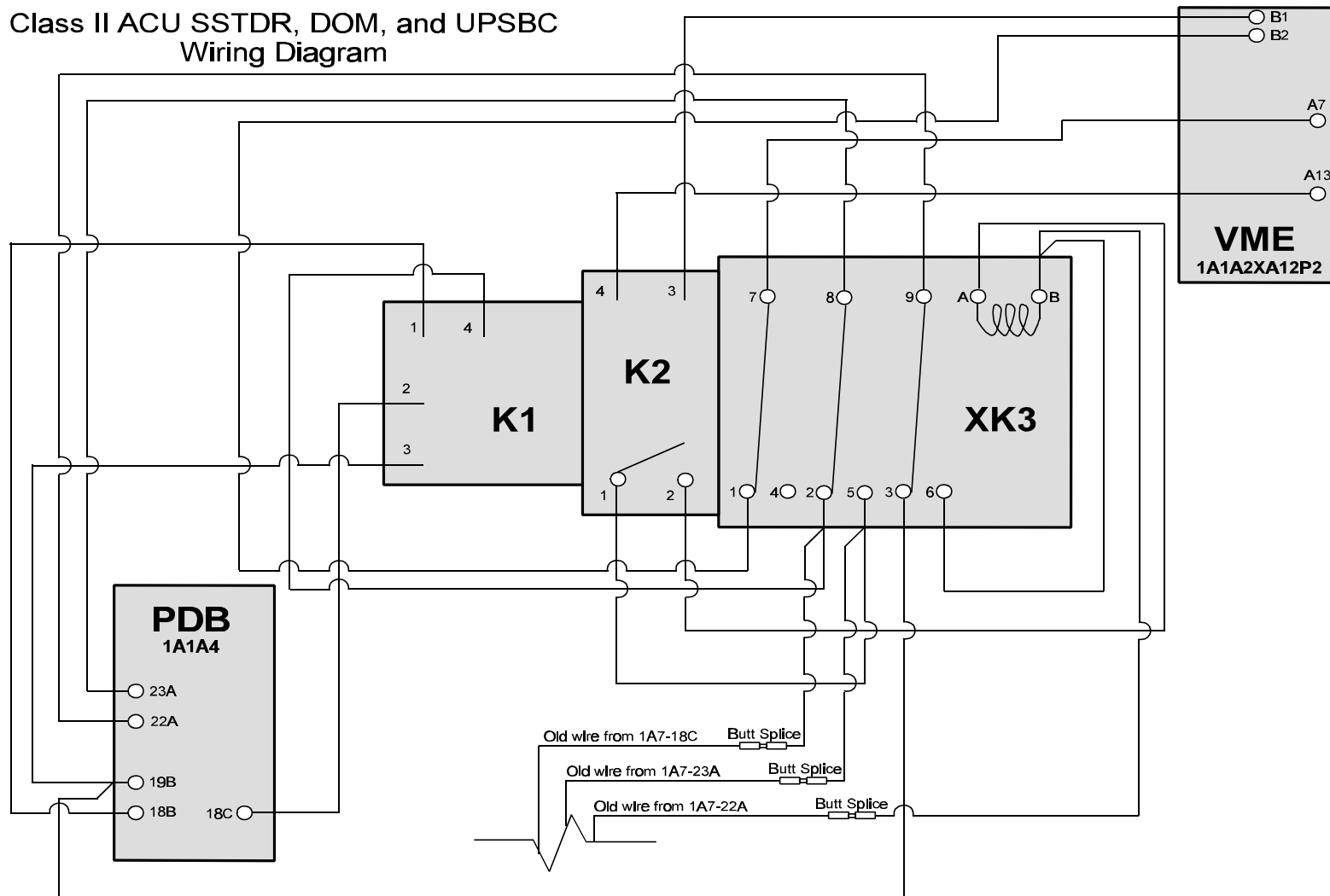spellcheck:10/5/99:src

The OT&E sites for the Solid State Time Delay Relay are:

| SID | Name | Cmssion Status | Staffing | | Config | Multiple Sensors | Comms | ZR | TSTM / ALDARS | GTA | ACE | RVR |
			NWS	FAA								
CLE	Cleveland, OH	Y	FT	-	2 DCP	M	AFOS	ZR	-	-	-	-
CON	Concord, NH	Y	FT/C	-	1 DCP	-	PACE	ZR	TSTM	GTA	-	-
DCA	National Reagan, VA	Y	-	FT/C	1 DCP	B	PACE	ZR	-	-	ACE	EDIT
MRB	Martinsburg, WV	N	-	-	1 DCP	-	ADAS	ZR	ALDARS	GTA	-	-
THV	York, PA	Y	-	-	1 DCP	-	ADAS	ZR	ALDARS	GTA	-	-
ABQ	Albuquerque, NM	Y	FT	-	1 DCP	-	AFOS	-	-	-	-	-
ALI	Alice, TX	N	-	FT/C	1 DCP	-	ADAS	-	ALDARS	GTA	-	-
COT	Cotulla, TX	N	-	FT/C	1 DCP	-	ADAS		ALDARS	GTA	-	-
CRP	Corpus Christi, TX	Y	FT	-	1 DCP	-	AFOS	-	-	-	-	
CSV	Crossville, TN	N	-	FT/C	1 DCP	-	ADAS	ZR	ALDARS	GTA	-	-
DHT	Dalhart, TX	N	-	FT/C	1 DCP	-	ADAS		ALDARS	GTA	-	-
INK	Wink, TX	N	-	FT/C	1 DCP	-	ADAS	ZR	ALDARS	GTA	-	-
LCH	Lake Charles, LA	Y	FT	-	1 DCP	-	AFOS	-	-	-	-	-
MEM	Memphis, TN	N	-	FT/C	3 DCP	B	ADAS	ZR	ALDARS	-	-	NGRVR

| SID | Name | Cmssion Status | Staffing | | Config | Multiple Sensors | Comms | ZR | TSTM / ALDARS | GTA | ACE | RVR |
			NWS	FAA								
OKC	Oklahoma City, OK	Y	-	FT/C	1 DCP	-	AFOS	ZR	-	-	ACE	NGRVR
PBF	Pine Bluff, AR	N	-	FT/C	1DCP	-	ADAS	ZR	ALDARS	GTA	-	-
SSI	Brunswick, GA	N	-	FT/C	1 DCP	-	ADAS	-	ALDARS	GTA	-	-
TCC	Tucumcari, NM	N	-	FT/C	1 DCP	-	ADAS		ALDARS	GTA	-	-
GRR	Grand Rapids, MI	Y	FT	-	2 DCP	M	AFOS	ZR	-	-	-	-
ICT	Wichita, KS	Y	FT	-	1 DCP	-	AFOS	ZR	-	-	-	-
ISN	Williston, ND	Y	FT	-	1 DCP	-	PACE	ZR	TSTM	GTA	-	-
LBF	North Platte, NE	Y	FT	-	1 DCP	-	AFOS	ZR	-	GTA	-	-
MCW	Mason City, IA	N	-	FT/C	1 DCP	-	ADAS	ZR	ALDARS	GTA	-	-
OFK	Norfolk, NE	Y	FT/C	-	1 DCP	-	PACE	ZR	TSTM	GTA	-	-
ACV	Arcata, CA	N	-	FT/C	1 DCP	-	ADAS	-	ALDARS	GTA	-	-
DAG	Daggett, CA	N	-	PT/C	1 DCP	-	ADAS	-	ALDARS	GTA	-	-
ELY	Ely, NV	Y	FT/C	-	1 DCP	-	PACE	-	TSTM	GTA	-	-
HVR	Havre, MT	Y	PT/C	-	1 DCP	-	PACE	ZR	TSTM	GTA	-	-
LAX	Los Angeles, CA	Y	FT/C	-	2 DCP	B	PACE	-	-	-	-	NGRVR
OAK	Oakland, CA	N	-	FT/C	1 DCP	B	ADAS	-	ALDARS		-	
SEA	Seattle, WA	Y	-	FT/C	2 DCP	B	PACE	ZR	-	-	-	NGRVR

| SID | Name | Cmssion Status | Staffing | | Config | Multiple Sensors | Comms | ZR | TSTM / ALDARS | GTA | ACE | RVR |
			NWS	FAA								
SLC	Salt Lake City, UT	Y	FT/C	-	2 DCP	M/B	AFOS	ZR	-	-	-	NGRVR
ADQ	Kodiak, AK	Y	FT	-	1 DCP	-	ADAS	ZR	-	-	-	-
FAI	Fairbanks, AK	Y	FT	-	2 DCP	M	ADAS	ZR	-	-	-	NGRVR
PAQ	Palmer, AK	Y	-	PT	1 DCP	-	GS-200	ZR	-	GTA	-	-
HNL	Honolulu, HI	Y	FT/C	-	2 DCP	B	ADAS	-	-	-	-	EDIT
ITO	Hilo, HI	Y			1 DCP	-	ADAS	-	-	-	-	-

Class II ACU SSTDR, DOM, and UPSBC Wiring Diagram

VME
1A1A2XA12P2

B1
B2
A7
A13

K1

K2

XK3

PDB
1A1A4

23A
22A
19B
18B   18C

Old wire from 1A7-18C   Butt Splice
Old wire from 1A7-23A   Butt Splice
Old wire from 1A7-22A   Butt Splice

Quantity	Nomenclature
	S100-FMK95ACU **ACU UPS Bypass and Time Delay Relay**
12	3-1/2" long wire tie wraps
1	W137 wire harness
1	W138 wire harness
1	Solid State Time Delay Relay (SSTDR) (K1)
1	SSTDR bracket
1	8-32 X 1-1/4" pan head #1 phillips machine screw
1	Digital Output Module (DOM) (K2)
1	High powered relay (K3)
1	Relay socket (XK3)
1	Wire retainer
2	Relay hold down clips
1	Plastic end clamp, gray
5	Insulated spade crimp-on terminal #14-16 AWG for #4 screw
3	Insulated butt splice
1	A7XK3-5 label
1	A7XK3-3 label
1	A7XK3-B label
2	A7XK3-2 label

A-26 (EMRS)